

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : Attorney Docket No. 2006_1228A
Ya XU et al. : Confirmation No. 6659
Serial No. 10/587,940 : Group Art Unit 1793
Filed September 29, 2006 : Examiner Sarah Van Oudenaren
INTERMETALLIC COMPOUND Ni₃Al : Mail Stop: AMENDMENT
CATALYST FOR REFORMING
METHANOL AND METHANOL
REFORMING METHOD USING SAME

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Ya Xu, the undersigned, a citizen of China, residing in Tsukuba-shi, Japan, do hereby declare:

1. I am a co-inventor of the above-identified application, Serial No. 10/587,940.
2. I am being compensated for my work related to the above-identified application.
3. I graduated from the University of Science and Technology Beijing, China in 1984 (B.S.); I graduated from the University of Science and Technology Beijing, China in 1989 (M.S.); and I received a Ph.D. from the University of Tsukuba, Japan in 1997.
4. I was an assistant engineer in the Technology Division of Beijing Coal Machinery Co., Ltd. in China from 1984 to 1986; I was an engineer in the Consulting Division of China Metallurgical Enterprise Management Association from 1989 to 1993; I was a Domestic Research Fellow of JST, Tsukuba Magnet Laboratory, National Research Institute for Metals (NRIM) in Japan from 1997 to 2000 (NRIM was reorganized and merged into the National Institute for Materials Science (NIMS), the Assignee of the above-application, in 2001); and I was a NEDO researcher at Smart Structure Research Center, National Institute of Advanced Industrial Science and Technology, in Japan from 2000 to 2003 (NEDO is New Energy and

The USPTO is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16, 1.17, and 1.492, which may be required by this paper to Deposit Account No. 23-0975.

Industrial Technology Development Organization, a subsidiary of the Ministry of Economy, Trade and Industry).

5. At the present time, I am a senior researcher in the Intermetallic Catalysts Group, Fuel Cell Materials Center, of NIMS.

6. I have co-authored several published articles relating to the technology claimed in the above-identified application, including: (i) Chun et al., "Catalytic properties of Ni₃Al foils for methanol decomposition," Catalysis Letters, Vol. 106, Nos. 1-2, Jan. 2006, pp. 71-75; (ii) Xu et al., "Catalytic properties of alkali-leached Ni₃Al for hydrogen production from methanol," Intermetallics, 13 (2005) 151-155; (iii) Chun et al., "Spontaneous catalytic activation of Ni₃Al thin foils in methanol decomposition," J. of Catalysis, 243 (2006) 99-107; and (iv) Xu et al., "Catalytic Properties of Ni₃Al Intermetallics for Methanol Decompostion," Materials Transactions, Vol. 45, No. 11 (2004), pp. 3177-3179. Copies of these publications are enclosed.

7. I have reviewed the present application, the pending claims, the outstanding Office Action dated May 27, 2010 and the references cited therein.

8. The Examiner states, "It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the method of producing hydrogen of Takuya [et al.] with the compound of Shaw [et al.] in order to increase the reforming reaction rate for methanol and further, as Lessing teaches the Ni₃Al intermetallic material being used as a catalyst for methane reformation, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a similar material for a similar purpose" (see the paragraph bridging pages 2-3 of the Office Action).

9. Shaw et al. disclose an intermetallic powder of Ni₃Al (see col. 10, lines 21-22). However, Shaw et al. do not disclose or suggest that the Ni₃Al powder could increase the reaction rate of a catalytic reaction, and do not disclose or suggest the use of Ni₃Al powder for a methanol reforming reaction.

10. Takuya et al. disclose the use of a Ni-Cu alloy or an Ni-Zn alloy deposited on an Al-containing metal member for a methanol reforming reaction (see Abstract). However, Takuya et al. do not disclose or suggest the use of a Ni-Al alloy for a methanol reforming reaction, and do not disclose or suggest the use of Ni₃Al in a Ni-Al alloy for a methanol reforming reaction.

11. Shaw et al. do not disclose or suggest that a Ni₃Al powder could increase the reaction rate of a catalytic reaction and do not disclose or suggest the use of an Ni₃Al powder for a methanol reforming reaction. Consequently, there would have been no reasonable expectation of success to one of ordinary skill in the art that using the Ni₃Al powder disclosed in Shaw et al. with the Al-containing metal member used in the methanol reforming reaction disclosed in Takuya et al. would increase methanol reforming reactivity.

12. Lessing discloses Ni₃Al having catalytic activity for a steam reforming reaction of a hydrocarbon. The reference does not disclose or suggest catalytic activity for a methanol reforming reaction. A hydrocarbon (C_nH_m) is a compound consisting of only carbon atoms and hydrogen atoms. Methanol (CH₃OH) is a type of alcohol, and it is not a hydrocarbon because it includes oxygen. A steam reforming reaction of a hydrocarbon and a methanol reforming reaction are both reactions to form hydrogen, but they are quite different from each other.

13. In general, in the field of catalytic reactions, a compound exhibits catalytic activity to a specific reaction system. However, when the reaction system differs, for example, when the starting materials differ, the same compound would not necessarily exhibit the same catalytic activity in a different reaction system. One of ordinary skill in the art would recognize that the catalytic activity of a reaction system is not predictable.

14. Therefore, there would have been no reasonable expectation of success that applying a compound exhibiting catalytic activity in a specific reaction system (i.e., a steam reforming reaction of a hydrocarbon) also exhibits catalytic activity in a different reaction system (i.e., methanol reforming reaction). There would have been no reasonable expectation of success that all compounds would exhibit catalytic activity, simply because a specific Ni₃Al compound exhibits catalytic activity in a specific reaction system (i.e., a steam reforming reaction of a hydrocarbon).

15. Accordingly, there would have been no reasonable expectation that Ni₃Al, which has catalytic activity in a steam reforming reaction of hydrocarbon, also has activity in a methanol reforming reaction.

16. Therefore, there would have been no reasonable expectation of success of arriving at the claimed invention in view of Shaw et al., Takuya et al. and Lessing.

I further declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Date: September 28, 2010

Xu Ya

Ya Xu